

Study on Comprehensive Benefit Evaluation of Prefabricated Building Based on Analytic Hierarchy Process from the Perspective of Environmental Protection

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Abstract

AHP is a tool to help construction enterprises to find their own problems. It has been widely used in the field of building comprehensive benefit evaluation to control and manage the whole process of prefabricated building construction, so as to continuously improve the level of building management. The application of AHP to construction enterprises can also help them find the deficiencies in the process of comprehensive benefit evaluation and improve the comprehensive benefit evaluation, so as to maintain a leading position in the fierce market competition. This paper integrates the characteristics of the original prefabricated building comprehensive benefit evaluation model, starts with prefabricated building cost management from two aspects of project and time, and explores its application in prefabricated building comprehensive benefit evaluation by combining the relevant theoretical knowledge and ideas of ahP.

Keywords: ahP, Prefabricated Building, Comprehensive Benefit Evaluation, Prefabricated Model;

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1. Introduction

With the continuous development of China's construction engineering, in recent years, China's construction engineering industry has gradually stepped into the direction of automation, numerical control and sensitive, high-end, construction engineering cost audit is still the top priority. Although the vigorous development of information technology drives the innovation of a variety of Internet technologies, it is undeniable that the cost audit of construction engineering also has a broad scope of work, flexible operability and relatively complex task characteristics, which cannot be completely replaced by modern information technology. In the construction project assembly debugging and installation maintenance work also

needs the construction project to complete. Construction project cost audit always plays an important role in construction engineering, and it is of great significance to study it deeply^[1, 2].

2. Related concepts

2.1. Concept of comprehensive benefit evaluation of buildings

In the process of construction and production, construction enterprises spend a certain amount of building raw materials, machinery costs and manual management costs to promote and manage the progress of construction, which is called comprehensive construction benefit evaluation. The sum of all the expenses of the whole construction process is called the construction cost of a building

project.



Figure 1. The most basic construction site prefabricated building.

By conducting building comprehensive benefit evaluation, can effectively find the construction enterprises in management, comprehensive benefit evaluation of the various shortcomings and weaknesses, auxiliary construction enterprises to overcome the shortcomings, further enhance the level of construction and management, in an efficient, safe construction of the comprehensive benefit evaluation of construction projects within the confines of increasing enterprise benefit.

2.2. Prefabricated construction concept

The corresponding American institutions have pointed out that construction activities should find a balance between the needs and ideas of people related to construction projects in a series of processes such as opening, planning, implementation, control and completion, and the steps of management should be repeated repeatedly.

Prefabricated construction enterprises are directly related to the specific situation of architectural development: from relatively mature to relatively mature, the project can be completed more excellently.



Figure 2. Overall design and building stock of prefabricated buildings.

As shown in Figure 2, the key points required for building prefab models include contents to be further improved and methods to be improved. In the construction process, the model is used to estimate the prefabricated construction, and perfect measures are given to evaluate the enterprise state.

2.3. Concept of whole-process AHP

The analytic hierarchy process (AHP) is a systematic management of the amount of money needed to be invested in terms of contents, facilities and services involved in projects in enterprises. Concept of combining analytic hierarchy process (ahp), and in the cost control, planning, construction steps further fusion, tend to be involved in all the personnel involved in the project work, including the owner, the construction enterprises and design units, supervision and management departments, consulting, etc., are stretched - of QianCheMian widely. Therefore, the whole process ANALYTIC hierarchy process needs to be managed for the whole process, all elements, all risks and the whole team.

3. The development status of prefabricated building comprehensive benefit evaluation

3.1. The value of building prefabricated model construction

According to the previous description, it can be seen that there are still many defects in the progress of comprehensive benefit evaluation of buildings in China. Relatively speaking, the service scope of

construction units in China is not very wide, and the level of comprehensive construction benefit evaluation service is high or low. Prefabricated model construction can promote the level of construction enterprises in China. Prefabricated models are of great significance to architecture, and different models can use their different estimates to divide project prefabricated models. Through the interview with the staff with rich experience in cost management, I learned that the current level of construction units is too low, do not have a series of scientific methods for evaluation, construction units themselves are often evaluated through experience^[3].

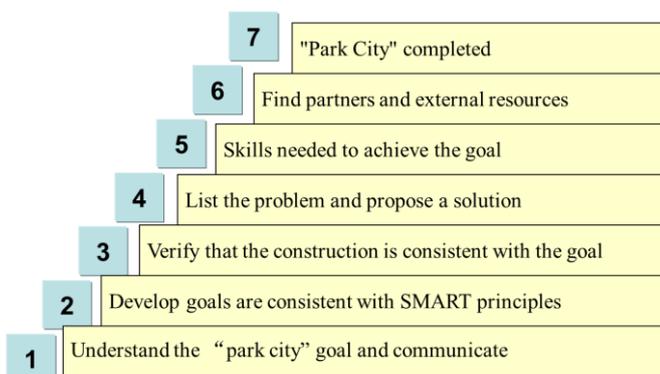


Figure 3.Comprehensive benefit assessment of prefabricated building based on ahP.

Therefore, in the comprehensive benefit evaluation and management of construction enterprises, the integration of prefabricated model can enable construction enterprises to realize the prefabricated status of all the projects in their progress, so as to take corresponding improvement and upgrading, which is conducive to the improvement of the cost management ability of the entire construction industry.

3.2. Main characteristics of building comprehensive benefit evaluation

3.2.1 Systemic

The whole process of project cost management is directly related to project all can get the interests of the units or enterprises: construction enterprises, construction department, design department, material supply mechanism, etc., management will be involved in these units or the income of the enterprise,

project, produced a wide range of information exchange. To carry out the comprehensive benefit evaluation management of buildings, it is necessary to take the whole use process of the project as the base point and control the cost in all construction steps, so as to make the project operate better.

3.2.2. Creative

Construction project design and construction are often unique, so the building services according to different projects, according to the inherent characteristics of project, in view of the project with science and technology level, economic value, and the corresponding rules and regulations, agreements, documents, etc. To carry out a series of analysis, so as to give a perfect suggestion. Therefore, the construction comprehensive benefit evaluation management can reflect its unique innovation.



Figure 4.Comprehensive benefit evaluation of buildings from the perspective of environmental protection.

3.2.3. Professionalism and experience

The premise of building comprehensive benefit evaluation management lies in the basic knowledge of project cost, and the essential content is the combination of engineering quantity and comprehensive unit price calculation. Only after further understanding of basic professional knowledge can comprehensive cost management be carried out^[4]. Control the related expenses at the beginning of the project development, control the contract during the project, and manage the final accounts at the end of the project. Project cost usually

needs to rely on the accumulation of rich experience to better complete.

The rural environmental comprehensive improvement project implements five systems: responsibility system, reporting system, county-level financial reporting system, publicity system and farmer participation system. The responsibility for the comprehensive improvement of the rural environment lies mainly in the localities, and the people's government at the county level is the main body of responsibility. Within 20 working days after the provincial finance budget is issued, the county-level people's government shall organize the completion of the revision and improvement of the project implementation plan, report it to the provincial (city) level environmental protection and financial department for approval, and report it to the provincial environmental protection and finance department for the record. . Among them, the water supply pipe can be selected from PE water supply plastic pipe, ductile iron pipe and galvanized steel pipe. When the water source, water transmission line topographic conditions, transportation and secondary handling conditions permit, self-stressed reinforced concrete pipes and pressurised reinforced concrete pipes may also be used; and the pipe diameter of the water pipe shall be determined by calculation. The water pipe diameter is generally calculated using the following formula:

$$f(x) = a_0 + \sum_{n=1}^{\infty} \left(a_n \cos \frac{n\pi x}{L} + b_n \sin \frac{n\pi x}{L} \right) (1)$$

Where: -- Water pipe diameter (m) $f(x)$

-- Flow at the highest Daily Maximum condition (m³/S) a_0

X - Flow rate (m/S)

In the design, the economic flow rate is used to control the head loss value of the pipe section (generally about 5m/Km) to determine the economic pipe diameter.

3.2.4. Communication and coordination

To carry out the project construction, construction cost engineer comprehensive benefit evaluation

activities need for all involved in the enterprise or department, cost personnel needs to have high levels of organization or coordination level, for multiple participating enterprises and departments to carry out the reasonable communication, thus is advantageous to the normal work, only in the aspect of interactive reasonable and efficient, can better play to the value of the organization.

4. Application of AHP in comprehensive benefit evaluation of prefabricated building

4.1. Operational characteristics of AHP in building comprehensive benefit evaluation

4.1.1. Scientific and effective

At present, the evaluation of the construction unit itself is mostly based on experience, so the indicator mechanism according to which the model is established in this paper (as shown in Figure 1 below) needs to be scientific to supplement the deficiencies existing in the actual operation at this stage. This paper will use the collection of literature materials and interviews with experts to improve the evaluation index of enterprise utilization, and make the model more scientific and effective by induction.

4.1.2. Easy operation

Using the model of personnel is to carry out the construction unit of the staff and the owner of one party, the cost of staff but is owner party again good, the staff of professional ability will have the high and low, so the evaluation index needs to be simple, easy to operate, reasonable use, can be most professional indicators discussed cannot too complicated, let a person cannot understand, otherwise is not conducive to the evaluation results of the model. At the same time, the construction of index mechanism needs to fully integrate the characteristics of comprehensive benefit evaluation of buildings^[5].

4.1.3. Regularity

The formation of the indicator mechanism cannot be a matter of mere whim, but needs to be carried out in accordance with the whole steps of cost management, project planning and project focus of the enterprise.

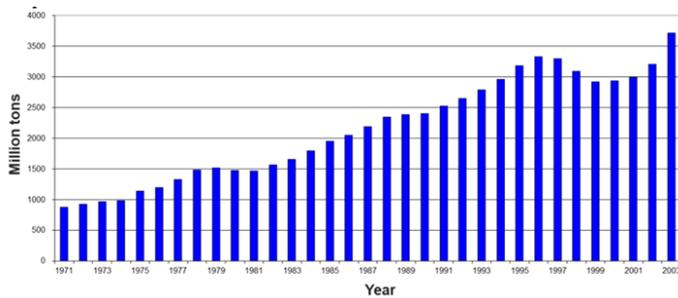


Figure 5. Evaluation of the integrated benefits of prefabricated buildings.

The evaluation index must include the key content of the whole process cost management. All the indexes must be independent from each other and there is no duplication. All the indexes need to highlight their own key. In view of the overall mechanism of indicators, there is a division between superiors and subordinates, so in the process of index division, it is necessary to make clear the connotation of indicators and construct a series of perfect and regular evaluation indicators^[6].

4.1.4. Quantitative and qualitative integration

Prefabricated evaluation of construction enterprise cost management is not only verbal, but also needs to be further quantified to produce a digital model, which can let the person in charge of the company clearly understand the evaluation results. Therefore, in the construction of the index system, it is necessary to carry out qualitative and quantitative simultaneously.

4.2. AHP is applied to the architecture of comprehensive benefit evaluation system

4.2.1. This initial stage

Analytic hierarchy process (ahp) is applied to the initial period, almost no rules to follow in the service and management, aiming at building comprehensive benefit evaluation of content management services are all have no idea, just rely on the cost of staff itself have work experience, if the cost of the staff leave, what all need to start all over again, will not be able to continue to work; Construction units do not have too high requirements on their own professional staff, staff do not have high quality, there is no way to help cost engineers in the enterprise to carry out daily work; The enterprise does not have the cultural

environment, the management is disorganized.



Figure 6. Building benefit evaluation from the perspective of environmental protection.

4.2.2. Standardization level

This stage of the enterprise unit, services and management have certain rules to follow, cost management begins to cause enough attention, job, there are corresponding with the rules and regulations, all kinds of affairs management began to have a document, no longer rely on personal experience, began to have certain system can follow; Construction units require employees to have certain qualifications, have a certain quality, in accordance with a certain order to carry out peacetime management of employees. This stage is a transitional period, linking the first and third stages.

4.2.3. Defined levels

Etc. So the second phase of the upgrade, at this stage in terms of service and management have certain rules to follow, caused the enough attention, cost management work progress, all carried out standardized management, and put all the content is generated standard document material to custody and implement, enterprise content of the project success rate significantly promoted, successful experience for the accumulation of more information content.

4.2.4. Controllable level

At this stage, active management has begun. When building units carry out whole-process ANALYTIC hierarchy process (AHP) activities, there are norms to follow. Cost management is more quantitative, with clear goals and specific plans, and relevant regulations must be strictly implemented in work. At

the same time, I should closely cooperate with the cost staff of the enterprise, actively provide valuable solutions, actively interact with the cost engineers, show my own ideas, and reasonably and efficiently deal with the deficiencies in the enterprise management in the first time. The cooperation level of the construction unit team has been significantly improved, and the enterprise culture has a direct effect on the enterprise staff, with a good working environment.

4.2.5. Optimizing level

This stage belongs to the highest stage of ahP fusion. It is in constant development and change, the enterprise from the original stage of continuous improvement and perfection, gradually upgrade, and has made certain progress. At this stage, the cost management begins to have a higher degree, and the management work puts the key on the whole project. The construction enterprise team cooperation level is highly promoted; the goal unification can complete the work reasonably and scientifically.

4.3. Exploration on prefabricated grade evaluation of building comprehensive benefit Evaluation management

The evaluation of prefabricated index mechanism has been applied to more and more researches. In most cases, analytic hierarchy process (AHP) is used to carry out the evaluation of assembled indicators. However, each evaluation has its own limitations. If a single evaluation method is used for evaluation, the results may not be the most accurate. For example, the deficiency of AHP is that when there are many factors, the evaluators need to have a very accurate grasp of the relationship between the problems, in order to make an accurate judgment, otherwise there will be mistakes.

In the model used in this paper, because there are a large number of indicators at the indicator level, it is easy to make mistakes if each indicator is scored, so it is only determined for five key indicators. In this way, errors in evaluation results caused by evaluation methods themselves can be reduced. By using the comprehensive scoring method shown in Figure 2 to evaluate the category layer, the fuzziness and

uncertainty of judgment can be well solved. Then, through the quadrant method, the target layer index assembly evaluation, so as to determine the present situation of enterprise assembly, and can put forward the enterprise improvement path.

5. Construction and management of project cost

5.1. Construction cost composition

Construction engineering cost has two meanings. On the one hand, construction engineering cost refers to: from the perspective of "investor-owner", the cost or amount of investment invested in the construction project; On the other hand, from the perspective of market transaction, project cost refers to "contract price" and "contract price". With the continuous development and globalization of information economy, the detailed identification of hazard sources is gradually applied to the construction engineering industry. Moreover, it plays an important role in the development of the construction engineering industry. Only after the implementation of cost audit in the construction engineering industry can we more accurately find opportunities, innovate development, and optimize the combination of the development and operation of the domestic construction engineering industry elements. At the same time, the domestic construction engineering industry in China is insufficient in the application of cost audit, and there are some problems.

5.2. Management of project cost

5.2.1. Connotation of project cost management

With the continuous advancement of China's information situation, in recent years, many areas of China's information development and domestic construction project management system have been visible improvement and progress. In many construction projects, the importance of cost audit is not fully understood, and the management system of this part of construction projects is imperfect or has loopholes, leading to the failure to fully connect with the economic development market in the new era. In addition, due to the management's insufficient attention to the management of construction projects, there is still a shortage of professional management

talents in the operation of the construction project management system in China, which also increases the risk of safety accidents in the operation of the construction project management system in China. At present, most of China's domestic construction engineering management system design has not formed a reasonable and perfect construction engineering talent management system, it is risky for those who do not have professional management ability to check and supervise the work of domestic construction engineering management system.

5.2.2. Measures for project cost management

Accordingly in the background of the new era, the contemporary construction engineering can be merged more elements, to perfect the system of project construction personnel construction, and through the innovative talent management system to further encourage the development of the innovation of the engineering personnel, establish and improve the domestic engineering cost management in construction project management system, strengthen the management of corresponding professional knowledge training, strive to smooth resource guarantee for the development of the work, and the construction project cost audit also need to start from raw materials, select qualified, standard of raw materials, its often to lay a good foundation for the follow-up maintenance and maintenance:



Figure 7. Study on comprehensive benefit evaluation of selected qualified buildings.

In addition to the above 7 standard building bearing steel raw materials, the domestic construction engineering need to include the risk assessment of raw materials in the evaluation of overall management, by strengthening the construction of

internal control dynamics, to adjust the working atmosphere and environment of construction projects, and further explored all aspects of the risks and issues, build a more reasonable and effective system of policy, scientific and reasonable to related layout as well as to prevent the occurrence of vicious competition and other construction projects.

5.2.3. Relationship between project cost management objectives at various stages

The project cost at different stages has different management objectives, which should be based on the characteristics of the contemporary era, starting from the daily construction of the construction project, clearly implement the corresponding operation standards and management process, and better manage the construction project, so as to make the platform construction of the construction project more smooth and the relevant management more comprehensive.

6. Conclusion

To sum up, AHP plays an important role in the comprehensive benefit evaluation of buildings. It takes the commission of construction enterprises as the premise, conducts supervision on the work steps and specific behaviors directly related to the project cost during the whole life cycle of the project, and provides scientific and efficient treatment methods for the existing deficiencies. From the analysis of this paper, it can be concluded that the advantages of building comprehensive benefit evaluation are also obvious: first, the cost management can be carried out more accurately, and the cost can be controlled reasonably from the initial stage to the completion of the project. Secondly, the project is integrated with cost management at the beginning, which can better control the cost. Third, the comprehensive benefit evaluation management of the building makes all the steps of the project closely integrated, which is conducive to reducing the generation of construction costs.

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